

48. $R = m^2 \left(\frac{c}{2} - \frac{m}{3} \right)$

c constan
 m med
 R reaction

$\frac{dR}{dm}$ - sensitivity

$$\frac{dR}{dm} = m^2 \left(0 - \frac{1}{3} \right) + 2m \left(\frac{c}{2} - \frac{m}{3} \right)$$

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52. $x = \text{time (yrs)}$

65(m) members $\$252(c)$ total cost

cost inc $\frac{dx}{dt}$ $\frac{1}{yr}$ membership inc $\frac{dx}{dt}$ $\frac{6}{yr}$

inst rate of change in find $\frac{ds}{dx}$ share = s

$$s = \frac{250}{65}$$

$$s = \frac{c}{m}$$

$$\frac{ds}{dx} = m \cdot \frac{dc}{dx} - c \frac{dm}{dx}$$

$$= \frac{65 \cdot 10 - 250 \cdot 6}{65^2}$$

$$\frac{ds}{dx} = -.20 \frac{\$}{yr}$$

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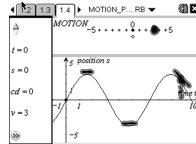
3.4a Position, Velocity, Acceleration

How is the position of the particle related to the graph?

ycord = position
 (where it is)

How is the velocity of the particle related to the graph?

slope of tan = velocity
 (where its going)
 direction



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position

$$x(t)$$

velocity

$$v(t) = x'(t)$$

$$v = \frac{dx}{dt}$$

acceleration

$$a(t) = v'(t)$$

$$a = \frac{dv}{dt} = \frac{d^2x}{dt^2}$$

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Ex 4 p130 A dynamite blast propels a heavy rock straight up with a launch velocity of 160 ft/sec. It reaches a height of $s = 160t - 16t^2$ after t seconds.

Find a) max height, b) velocity and speed when height = 256 c) acceleration d) hang time

a) max height occurs when $v = 0$

$$v = 160 - 32t = 0 \quad t = 5$$

$$\text{max height} = s(5) = 160(5) - 16(5)^2 = 400$$

b) $256 = 160t - 16t^2$ solve for t $t = 2, 8$

$$v(2) = 96 \text{ ft/sec}$$

$$v(8) = -96 \text{ ft/sec}$$

c) $a = -32 \frac{\text{ft}}{\text{sec}^2}$

d) $s = 0$
 $s = 160t - 16t^2 = 0 \quad t = 0, 10 \text{ sec}$

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Ex 5 p131

A particle moves along a horizontal line so that its position at any time $t \geq 0$ is given by the function $s(t) = t^2 - 4t + 3$. (meters)

a) find the displacement during the first 2 seconds

$$\Delta s = s_2 - s_1 \quad s(2) - s(0) = 1 - 3 = -2$$

b) find the average velocity during the first 4 seconds

$$\frac{s(4) - s(0)}{4 - 0} = 0 \text{ m/s}$$

c) find the instantaneous velocity when $t = 4$

$$s'(4) \quad s'(t) = 2t - 4 \big|_{t=4} = 4 \text{ m/s}$$

d) find the acceleration when $t = 4$

$$a = 2 \text{ m/s}^2$$

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e) describe the motion of the particle

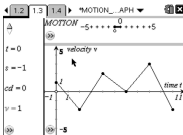
starts at $x=3$ moves left
stops (at rest) $t=2$, then goes
right

f) use parametric graphing to view the motion for the particle

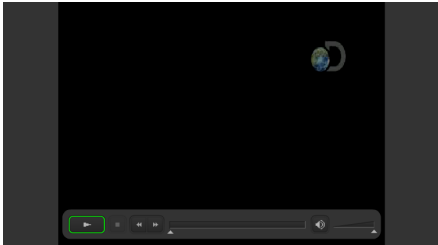
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position from velocity

A particle moves along a horizontal line. The graphs shows its velocity. Describe the motion of the particle.



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slow mo

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